

AMENDMENTS TO THE CLAIMS

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1. (Currently Amended) A data output apparatus comprising:

C.1 a plurality of output circuits each of which receives and outputs a respective data signal, each said output circuit operating in response to a respective applied clock signal;

a clock source for supplying a first clock signal; and

a plurality of adjustable delay circuits for receiving said first clock signal, each of said adjustable delay circuits providing a respective delayed first clock signal to a respective one of said plurality of output circuits, wherein each adjustable delay circuit contains a programming circuit for programming a respective delay to be applied to the ~~respective~~ first clock signal, and wherein each programming circuit contains at least one fuse element for programming such that each of said respective data signals is output by said plurality of output circuits at substantially the same time.

2. (Original) A data output apparatus as in claim 1 wherein each of said output circuits has an associated output data hold time, the timing of which is adjusted by the delay of a respective delay circuit.

3. (Canceled)

4. (Canceled)

5. (Original) A data output apparatus as in claim 2 further comprising a plurality of data output terminals respectively connected to said output circuits, and

wherein the delay of each of said adjustable delay circuits is adjusted such that the data hold time as seen at said respective output terminal is substantially coincident.

6. (Original) A data output apparatus as in claim 1 wherein each of said delay circuits comprises:

an input for receiving said first clock signal;

C1 a plurality of delay elements, each of said delay elements providing different respective delay to a signal applied thereto; and,

a switch circuit for selectively causing a selected one of said delay elements to delay said first clock signal and apply a delayed first clock signal to a respective output circuit.

Claims 7-9 (Canceled)

10. (Original) A data output apparatus as in claim 6 wherein said switch circuit comprises a plurality of switch elements respectively coupled to said plurality of delay elements, one of said switch elements being selectively enabled to apply said first clock signal to its respectively coupled delay element.

11. (Original) A data output apparatus as in claim 10 further comprising a programmable circuit for programming which of said switch elements is selectively enabled.

12. (Original) A data output apparatus as in claim 1 wherein said output circuits are output buffer circuits.

13. (Original) A data output apparatus as in claim 1 wherein each of said output circuits receives and outputs a respective data signal from a memory array.

14. (Canceled)

15. (Currently Amended) A processor based system comprising:

a processor; and

at least one memory circuit coupled to said processor, at least one of said processor and memory circuit including a data output apparatus comprising:

CI a plurality of output circuits each of which receives and outputs a respective data signal, each said output circuit operating in response to a respective applied clock signal;

a clock source for supplying a first clock signal; and

a plurality of adjustable delay circuits for receiving said first clock signal, each of said adjustable delay circuits providing a respective delayed first clock signal to a respective one of said plurality of output circuits, wherein each adjustable delay circuit contains a programming circuit for programming a respective delay to be applied to the ~~respective~~ first clock signal, and wherein each programming circuit contains at least one fuse element for programming such that each of said respective data signals is output by said plurality of output circuits at substantially the same time.

16. (Original) A processor based system as in claim 15 wherein each of said output circuits has an associated output data hold time, the timing of which is adjusted by the delay of a respective delay circuit.

17. (Canceled)

18. (Canceled)

19. (Original) A processor based system as in claim 16 wherein each of said output circuits is coupled to a respective output terminal and the delay of each of said adjustable delay circuits is adjusted such that the data hold time as seen at said respective output terminal is substantially coincident.

C/ 20. (Original) A processor based system as in claim 15 wherein each of said delay circuits comprises:

an input for receiving said first clock signal;

a plurality of delay elements, each of said delay elements providing a different respective delay to a signal applied thereto; and,

a switch circuit for selectively causing a selected one of said delay elements to delay said first clock signal and apply a delayed first clock signal to a respective output circuit.

Claims 21-23 (Canceled)

24. (Previously Presented) A processor based system as in claim 20 wherein said switch circuit comprises a plurality of switch elements respectively coupled to said plurality of delay elements, one of said switch elements being selectively enabled to apply said first clock signal to its respectively coupled delay element.

25. (Original) A processor based system as in claim 24 further comprising a programmable circuit for programming which of said switch elements is selectively enabled.

26. (Original) A processor based system as in claim 15 wherein said output circuits are output buffer circuits.

27. (Original) A processor based system as in claim 15 wherein each of said output circuits receives and outputs a respective data signal from a memory array.

28. (Canceled)

29. (Currently Amended) A memory device comprising:

a memory core; and

C1 a data output apparatus coupled to said memory core and comprising:

a plurality of output circuits each of which receives and outputs a respective data signal from said core, each said output circuit operating in accordance with a respective applied clock signal;

a clock source for supplying a first clock signal; and

a plurality of adjustable delay circuits for receiving said first clock signal, each of said adjustable delay circuits providing a respective delayed first clock signal to a respective one of said plurality of output circuits, wherein each adjustable delay circuit contains a programming circuit for programming a respective delay to be applied to the respective first clock signal, ~~and wherein~~ each programming circuit ~~contains~~ containing at least one fuse element for programming such that each of said respective data signals is output by said plurality of output circuits at substantially the same time.

30. (Original) A memory device as in claim 29 wherein each of said output circuits has an associated output data hold time, the timing of which is adjusted by the delay of a respective delay circuit.

31. (Canceled)

32. (Canceled)

33. (Currently Amended) A memory device as in claim 30, further comprising a plurality of data output terminals respectively connected to said output circuits, and

CI ~~wherein the delay of each of said adjustable delay circuits is adjusted such that the data hold time as seen at said respective output terminal is substantially coincident.~~

34. (Original) A memory device as in claim 29 wherein each of said delay circuits comprises:

an input for receiving said first clock signal;

a plurality of delay elements, each of said delay elements providing different respective delay to a signal applied thereto; and,

a switch circuit for selectively causing a selected one of said delay elements to delay said first clock signal and apply a delayed first clock signal to a respective output circuit.

Claims 35-37 (Canceled)

38. (Previously Presented) A memory device as in claim 34 wherein said switch circuit comprises a plurality of switch elements respectively coupled to said plurality of delay elements, one of said switch elements being selectively enabled to apply said first clock signal to its respectively coupled delay element.

39. (Original) A memory device as in claim 38 further comprising a programmable circuit for programming which of said switch elements is selectively enabled.

40. (Original) A memory device as in claim 29 wherein said output circuits are output buffer circuits.

C/ 41. (Currently Amended) A method of providing data output signals comprising:

receiving a plurality of data output signals at respective output circuits; ~~and~~

operating said output circuits in response to respective applied clock signals to make said data output signals available at ~~the output~~ respective outputs of said output circuits;

providing a first clock signal;

generating each of said respective applied clock ~~signal~~ signals from said first clock signal, each of said respective applied clock signals having a respective adjustable delay relative to said first clock signal; ~~and~~

programming each respective adjustable delay by modifying a conductive state of at least one of a fuse element and an anti-fuse element to select a delay rate; and

adjusting the delay of each of said respective applied clock signals such that the data output signals are output from said respective outputs of said output circuits at substantially the same time.

42. (Original) A method as in claim 41 wherein said data output signals are available at the outputs of said output circuits for a respective data hold time, the timing of said data hold time for each of said output circuits being independently adjusted by adjusting the delay of a respective applied clock signal.

43. (Original) A method as in claim 42 wherein the amount of delay of each of said applied clock signals is programmable.

CA 44. (Canceled)

45. (Original) A method as in claim 42, wherein each of said output circuits is connected to a respective output terminal, said method further comprising adjusting the delay of said applied clock signals such that the data hold time, as seen at each of said output terminals, is substantially coincident.

46. (Original) A method as in claim 45 wherein said terminals are exterior terminals of an integrated circuit package containing said output circuits.

47. (Original) A method as in claim 41 wherein each of said applied clock signals is generated by receiving said first clock signal and subjecting said received first clock signal to a selected one of a plurality of signal delays.

48. (Canceled)

49. (Currently Amended) A data output apparatus comprising:

a plurality of output circuits each of which receives and outputs a respective data signal, each of said output ~~circuit~~ circuits operating in response to a respective applied clock signal;



a clock source for supplying a first clock signal; and

CA a plurality of adjustable delay circuits for receiving said first clock signal, each of said adjustable delay circuits providing a respective delayed first clock signal to a respective one of said plurality of output circuits, wherein each adjustable delay circuit contains a programming circuit for programming a respective delay to be applied to the ~~respective~~ first clock signal, and wherein each programming circuit contains at least one anti-fuse element for programming such that said data signals are output by said plurality of output circuits at substantially the same time.

50. (Currently Amended) A processor based system comprising:

a processor; and

at least one memory circuit coupled to said processor, at least one of said processor and memory circuit including a data output apparatus comprising:

a plurality of output circuits each of which receives and outputs a respective data signal, each of said output ~~circuit~~ circuits operating in response to a respective applied clock signal;

a clock source for supplying a first clock signal; and

a plurality of adjustable delay circuits for receiving said first clock signal, each of said adjustable delay circuits providing a respective delayed first clock signal to a respective one of said plurality of output circuits, wherein each adjustable delay circuit contains a programming circuit for programming a respective delay to be applied to the ~~respective~~ first clock signal, and wherein each programming circuit contains at least one anti-fuse element for programming such that each of said

respective data signals is output by said plurality of output circuits at substantially the same time.

51. (Currently Amended) A memory device comprising:

a memory core; and

a data output apparatus coupled to said memory core and comprising:

a plurality of output circuits each of which receives and outputs a respective data signal from said core, each said output circuit operating in accordance with a respective applied clock signal;

a clock source for supplying a first clock signal; and

a plurality of adjustable delay circuits for receiving said first clock signal, each of said adjustable delay circuits providing a respective delayed first clock signal to a respective one of said plurality of output circuits, wherein each adjustable delay circuit contains a programming circuit for programming a respective delay to be applied to the ~~respective~~ first clock signal, and wherein each programming circuit contains at least one anti-fuse element for programming such that each of said respective data signals is output by said plurality of output circuits at substantially the same time.

52. (New) A data output apparatus as in claim 1, wherein each of said delay circuits comprises:

an input for receiving said first clock signal;

*C/ and* a plurality of delay elements, each of said delay elements providing different respective delay to a signal applied thereto; and,

a switch circuit for configuring said delay elements to provide a selected delay to the delayed first clock signal.

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